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ABSTRACT

Presented is a statement of goals and objectives to be used by the overseas dependent schools. This document is intended as a guide for program instruction by the teacher, as a basis for the evaluation of either commercial materials or those developed locally, as a basis for further evaluation of science education in the dependent schools, and as a starting point for developing other dependent school science objectives. The purpose of science education in the dependent schools is to prepare all students to be scientifically literate citizens. The goals and objectives listed are general and are intended to be used by educators in the selection of the most appropriate content for the particular grade level for which the materials are to be utilized. Included in the materials is a summary of science goals and program objectives, programs and instructional objectives, content and concepts, processes of science, the nature of science, science and technology, and society and scientific attitudes and values. (Author/DS)

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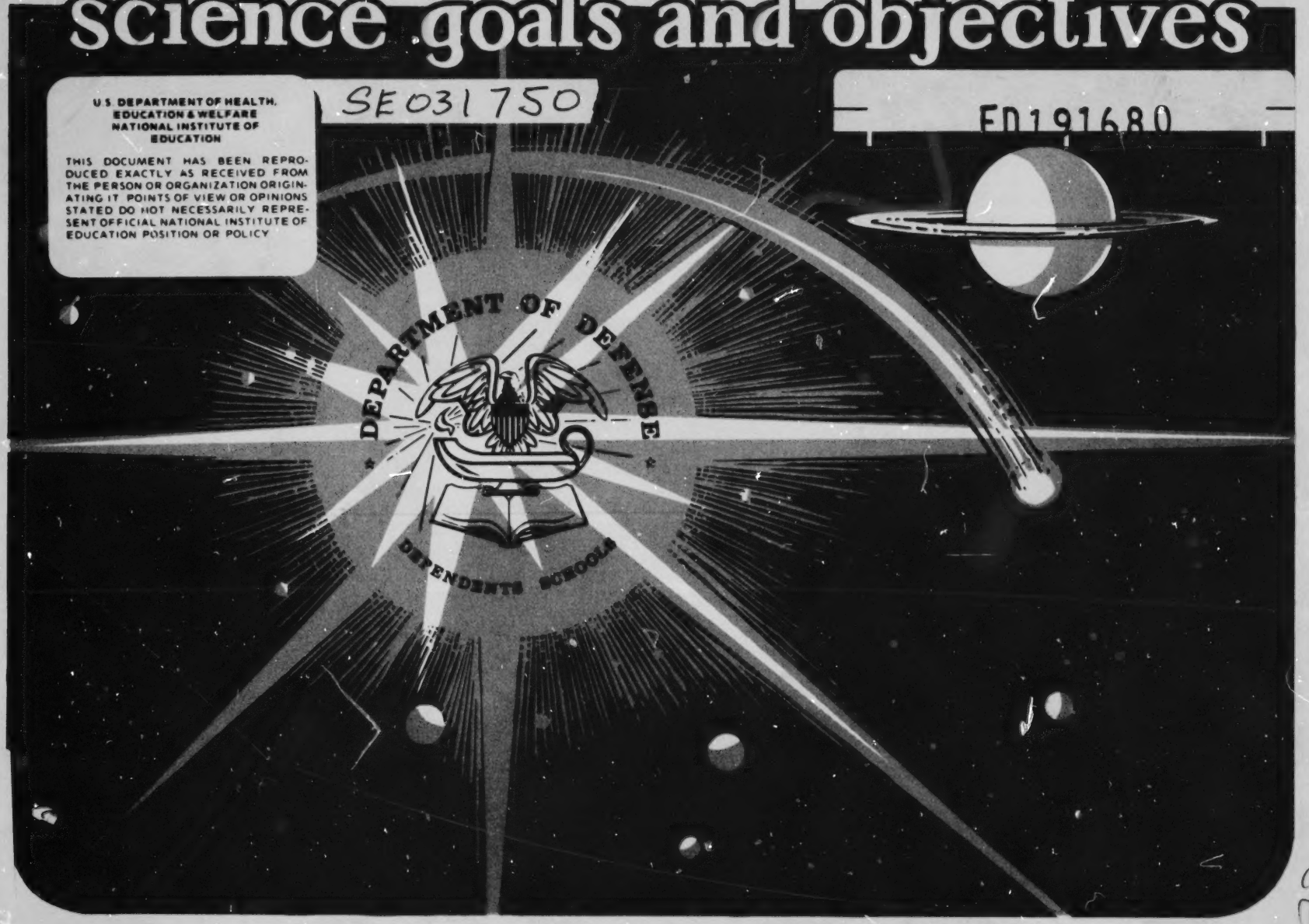
science goals and objectives



science goals and objectives

September 1978

Department of Defense
Dependents Schools

SEP 2 1980

preface

This statement of goals and objectives has involved many educators in DoDDS. During this past school year, teams of teachers have met in each of the three regions to prepare objectives. The regional sets then contributed to this document, presented for your review.

DoDDS is indebted to the many persons who have contributed to this document and particularly to the following educators:

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foreword

Science is an integral part of the curriculum of the Department of Defense Dependents Schools (DoDDS), K-12.

In this period of immensely accelerated change, it is our intent to help all of our students become citizens able to acquire and process information; to become citizens who have sufficient knowledge to ask intelligent questions and generate informed opinions. Beyond that, we wish to provide the specialized education needed by those whose major interests are in the field of science.

We hope that these Science Goals and Objectives give direction to teachers and to parents as they guide our students. We are deeply appreciative of the many contributions made to this statement by both teachers and parents.

Anthony Cardinale

Anthony Cardinale
Director

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introduction

This statement of goals and objectives was prepared by teachers, students, and specialists concerned about the urgent need for the scientific literacy of all citizens in our increasingly technological society. The statement was developed in support of the DoDDS Five-Year Curriculum Development Cycle and is designed to unify the thrust of science education in our overseas dependent schools.

This document is intended for use as a:

- guide for program construction by the teacher
- basis for the evaluation of either commercial materials or those developed locally
- basis for the further evaluation of science education in DoDDS
- starting point for developing other DoDDS science objectives

Although the six goals are intended to be comprehensive, the program and instructional objectives presented here are only *examples* of many which could be developed within each goal. Any one science course would normally be described by many more instructional objectives than are found in this list.

The purpose of science education in our system is to prepare all students to be scientifically literate citizens. Although the goals and objectives listed here are, ideally, for attainment by each student, our expectations must be tailored to each student.

The examples found here were determined considering:

- what is important for all DoDDS students to know regarding the scientific, technological society of today and the future
- the level of maturation of our students

Since the goals and objectives are general and are not drawn from a single program or course, educators can select those appropriate for emphasis at any grade level, in any DoDDS science program.

science goals and program objectives summary

1. The student should apply ***content and concepts*** from the biological, physical, and earth/space sciences.

The student should:

1.1 Know structure, function, and behavior of representative life forms.
1.2 Understand the principles of evolution and heredity.
1.3 Understand the interaction of physical and/or biological elements of the environment.
1.4 Understand the characteristics and reactions of matter.
1.5 Apply the concepts of force and motion.
1.6 Understand major energy forms and their transformation.
1.7 Understand the principles and concepts of earth/space science.
1.8 Apply safety measures appropriate to home, school, and field science activities.

2. The student should use ***processes*** of science in solving problems, making decisions, and furthering understanding.

The student should:

2.1 Observe and measure to acquire information.
2.2 Classify and use space/time relationships to organize information.
2.3 Infer, hypothesize, and predict to interpret information.
2.4 Formulate testable questions, make operational definitions, control variables, and design experiments to generate information.
2.5 Communicate the interpretation of data.

3. The student should understand the ***nature of science.***

The student should:

3.1 Understand that science is based on cause and effect.
3.2 Summarize the nature of scientific knowledge.
3.3 Summarize the nature of scientific inquiry as encompassing serendipity (chance), intuitive jumps, and induction as well as "the scientific method."
3.4 Evaluate the humanistic nature of scientific enterprise.

4. The student should evaluate the interrelationships among ***science, technology, and society.***

The student should:

4.1 Apply science/technology to common life tasks.
4.2 Recognize that science and technology can have both positive and negative effects on one's personal life.
4.3 Understand both the potentials and the limitations of science and technology.
4.4 Recognize the historical sequence and cumulative nature of important scientific discoveries.
4.5 Know the nature and scope of careers in science and technology.
4.6 Evaluate career opportunities in scientific/technological fields.
4.7 Demonstrate proficiency in entry-level, science-related job skills.

5. The student should demonstrate scientific ***attitudes.***

The student should:

5.1 Demonstrate a continuing interest in science-related, leisure-time activities.
5.2 Show curiosity about science-related phenomena.
5.3 Display confidence in own ability to use science.
5.4 Practice cooperation with others in scientific studies.
5.5 Use objective approach in problem solving.
5.6 Demonstrate divergent thinking in solving problems.

6. The student should develop science-related ***values*** which result in action constructive to the environment.

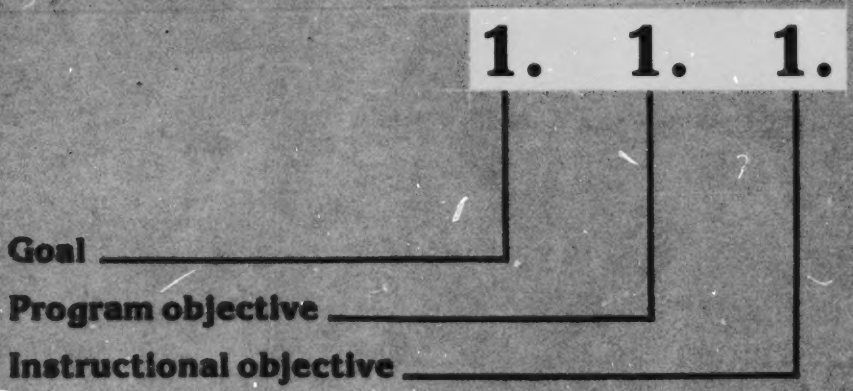
The student should:

6.1 Know the relationship between the state of the environment and the quality of life.
6.2 Understand the interdependence of people and the environment.
6.3 Understand the social and technological values involved in the use of resources.
6.4 Understand environmental organizations and agencies and their functions.
6.5 Show respect for the man-made environment.
6.6 Practice environmentally sound consumerism.
6.7 Demonstrate respect for the natural environment.

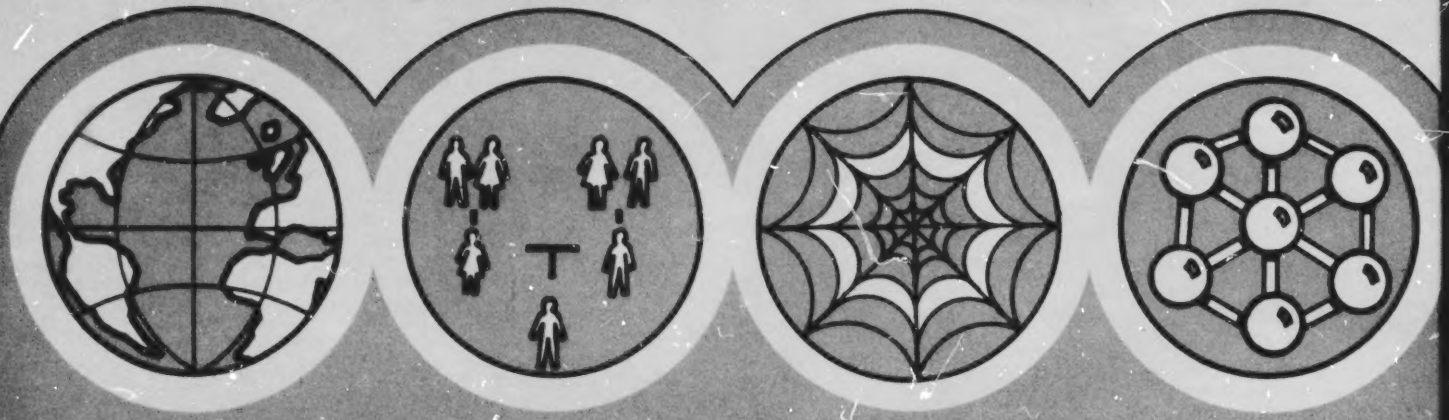
organization & numbering code

Statements in this document form a hierarchy from general goals and program objectives to specific instructional objectives. A hierarchial progression is intended from K-4 to the 9-12 bands. Instructional objectives with the same number in the K-4, 5-8, and 9-12 bands are related to each other and should indicate an increasing level of sophistication in the development of a concept. An objective at a low grade level remains an objective for all subsequent grade levels. There is no intended vertical hierarchy of objectives within each of the bands.

The first digit of the number of each statement refers to the goal in which it relates, the second digit refers to the program objective, and the third digit identifies the instructional objective.

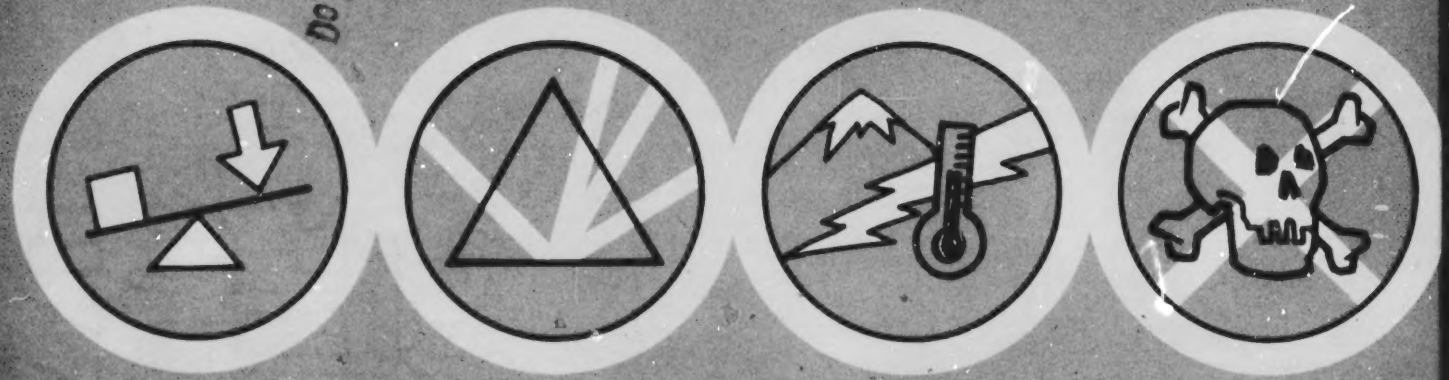


All goals and objectives statements should be preceded by the phrase, "the learner should..."



1.0

Apply the content and concepts from the biological, physical, and earth / space sciences.



1.1 Know structure, function, and behavior of representative life forms

K-4

1.1.1 Distinguish living from non-living things.

1.1.2 Identify major structural, functional, and behavioral characteristics of plants.

1.1.3 Identify major structural, functional, and behavioral characteristics of animals.

notes

5-8

1.1.1 Summarize the life functions that distinguish living from non-living things.

1.1.2 →

1.1.3 Name characteristics of a given class of animals, e.g., mammals, birds, reptiles, amphibians, and fish.

1.1.4 Describe behavior patterns of animals, e.g., migration, territorial protection.....

1.1.5 Describe differing types of growth, development, reproduction, and life cycles in plants and animals including humans.

notes

9-12

1.1.1 Relate animal cells, tissues, and organ system functions to life maintenance.

1.1.2 Relate plant cells, tissues, and system functions to life maintenance.

1.1.3 State the criteria for placing an animal in a given phylum-- Protista, Coelenterata, Echinodermata, Annelida, Arthropoda, Mollusca, Chordata.

1.1.4 →

1.1.5 →

notes

7

1.2 Understand the principles of evolution and heredity

K-4

1.2.1 Identify similarities and differences in physical characteristics of living things.

notes

5-8

1.2.1 Discuss similarities and differences between individuals within families.

notes

9-12

1.2.1 State the gene theory of heredity.

1.2.2 Apply the concept of dominance-recessiveness to predict the characteristics of offspring.

1.2.3 Compare evidence for and against the theory that plants and animals have physically evolved over time.

1.2.4 Paraphrase the theory of natural selection.

notes

1.3 Understand the interaction of physical and / or biological elements of the environment

K-4

1.3.1 Identify sources of energy for living things.

1.3.2 Identify food chains.

1.3.3 Identify environmental conditions appropriate for plants and animals.

1.3.4 Practice good health habits.

notes

5-8

1.3.1 Describe the flow of energy from the sun to organisms.

1.3.2 Draw a food web.

1.3.3 Outline the principal environmental factors that limit the distribution of plants and animals.

1.3.4 Know elements of human nutrition.

1.3.5 Identify ways in which germs are spread from one person to another.

1.3.6 Identify beneficial actions of bacteria.

notes

9-12

1.3.1 Explain requirements of photosynthesis and respiration.

1.3.2 Explain food chains, pyramids, and webs in terms of energy sources and losses.

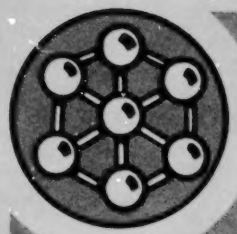
1.3.3 Explain the relationship of individuals, populations, communities, ecosystems, and environments in terms of interdependence, dynamic balance, and niches.

1.3.4 Design a personal physical fitness program.

1.3.5 Describe the germ, stress, deficiency, radiation, toxin, and genetic theories of disease.

1.3.6 →

notes



1.4 Understand the characteristics and reactions of matter

K-4

1.4.1 Identify the differences among solids, liquids, and gases.

1.4.2 Identify physical characteristics of matter.

1.4.3 Identify components of matter.

1.4.4 Identify changes in objects.

notes

5-8

1.4.1 Know that energy is involved in a change of state.

1.4.2 →

1.4.3 Describe an atomic model, i.e., electrons, protons, and neutrons.

1.4.4 Demonstrate the use of solvent action.

1.4.5 Identify substances as elements, compounds, or mixtures.

notes

9-12

1.4.1 Explain changes from a solid, to liquid, to gas in terms of kinetic molecular theory.

1.4.2 Distinguish among mass, weight, volume, density, hardness, luster, and texture.

1.4.3 →

1.4.4 Explain the principles of solubility.

1.4.5 Give examples and uses of acids, bases, salts, oxides, and organic compounds.

1.4.6 Give examples of inorganic and biological chemical processes.

1.4.7 Know that molecules are invisible particles whose presence sometimes may be detected by the senses.

notes

1.5 Apply the concepts of force and motion

K-4

1.5.1 Relate forces to the movement of objects.

1.5.2 Give examples of forces that move objects.

notes

5-8

1.5.1 Know that forces can change an object's shape, speed, and/or direction.

1.5.2 Understand the use and advantages of simple machines.

notes

9-12

1.5.1 Name physical factors that influence the distance and direction of a hit, thrown, or kicked object.

1.5.2 Describe differences in force, work, speed, velocity, acceleration, thrust, momentum, and inertia.

1.5.3 Give evidence for the particle nature of matter.

notes

1.6 Understand major energy forms and their transformation

K-4

1.6.1 Identify devices that change energy from one form to another.

1.6.2 Identify characteristics of thermal energy.

1.6.3 Identify characteristics of light.

1.6.5 Identify characteristics of sound.

1.6.6 Identify sources of electrical energy.

1.6.7 Identify uses of electricity.

1.6.8 Identify characteristics of magnetic forces.

notes

5-8

1.6.1 Describe ways energy appears to be "lost" when changed from one form to another.

1.6.2 Identify good heat conductors and insulators.

1.6.3 List sources of visible and invisible light.

1.6.4 Describe the results of reflection and refraction (bending) of light.

1.6.5 Demonstrate characteristics of sound.

1.6.6 Know how electric charges may be caused to move.

1.6.7 Construct series and parallel circuits.

1.6.8 Describe the operation of motors and generators.

1.6.9 Relate force, energy, and power.

notes

9-12

1.6.1 Describe an energy transformation in terms of the Law of Conservation of Energy.

1.6.2 Describe heat and temperature in terms of kinetic molecular energy.

1.6.3 State how selective absorption, reflection, and transmission of light causes objects to appear colored.

1.6.4 →

1.6.5 Explain the generation, transmission, and properties of sound.

1.6.6 Understand the differences between volts, amperes, watts, and kilowatt hours.

1.6.7 Describe the functions of the parts of a simple electrical system, e.g., that of an automobile.

1.6.8 Explain induction of electric and magnetic fields.

1.6.9 →

notes

1.7 Understand the principles and concepts of earth / space science

K-4

1.7.1 Identify weather conditions.

1.7.3 Describe weathering and other types of erosion.

1.7.5 Explain night and day in terms of earth rotation

1.7.6 Identify relative sizes and positions of bodies in the solar system.

notes

5-8

1.7.1 Explain the difference between climate and weather.

1.7.2 Describe air masses, fronts, and storms.

1.7.3 Identify the major geological features of the earth's surface.

1.7.4 Know major geomorphic processes, e.g., erosion, volcanic action.

1.7.5 State how the movement of the earth about the sun determines seasons and years.

1.7.6 Diagram the positions of sun, earth, and moon to explain phases of the moon and eclipses.

1.7.7 Tell how celestial bodies affect each other.

notes

9-12

1.7.1 Define relative humidity, chill factor, dew point, and comfort index.

1.7.2 Explain cloud and precipitation formation.

1.7.3 Know how prominent landscape features are believed to have been formed.

1.7.4 →

1.7.5 Explain the formation of tides.

1.7.6 Explain the use of the North Star as a navigational aid in terms of its position and unique behavior.

1.7.7 Describe moon, satellite, earth, and sun movements in terms of inertia and gravitational forces.

notes

1.8 Apply safety measures appropriate to home, school, and field science activities

K-4

1.8.1 Identify safe practices related to electrical outlets.

1.8.2 Identify poisonous substances commonly used in the home.

1.8.3 Use safe procedures when investigating unknown substances.

notes

5-8

1.8.1 Demonstrate safe practices when using gas and electrical appliances.

1.8.2 List storage hazards and proper storage practices for commonly used chemicals, including flammables.

1.8.3 Identify common poisonous plants and animals.

notes

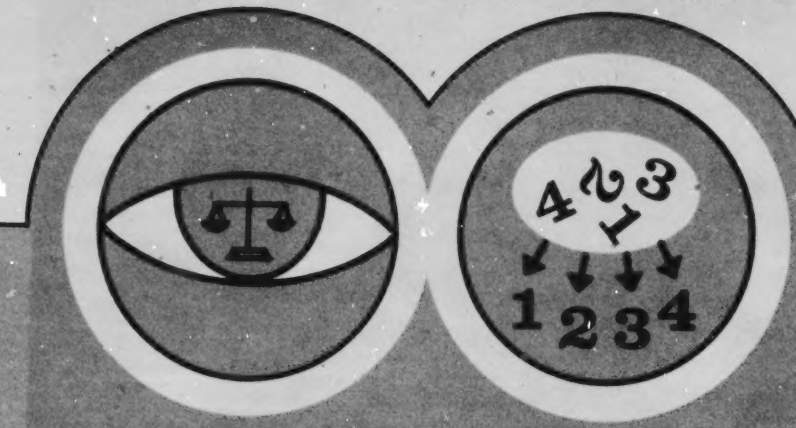
9-12

1.8.1 Explain functions of fuses, circuit breakers, and grounds.

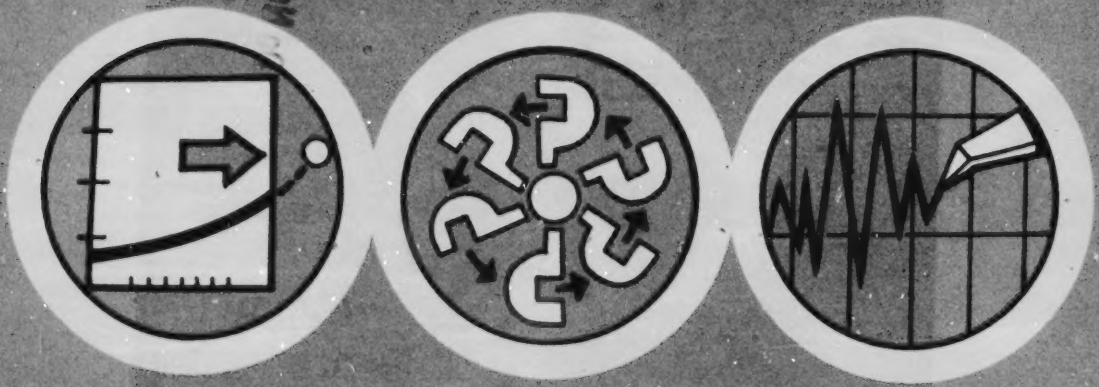
1.8.2 Describe appropriate first-aid treatment for each of the following: chemical poisoning, serious bleeding, cessation of breathing, and shock.

1.8.3 Demonstrate procedures to limit allergenic and microbiological hazards.

notes



2.0 Use processes of science in solving problems, making decisions, and furthering understanding.



2.1 Observe and measure to acquire information

K-4

2.1.1 Observe an object or event using more than one sense.

2.1.2 Observe an object or event by counting, comparing, estimating, or measuring.

2.1.3 Identify appropriate methods of measurement for a given task.

notes

5-8

2.1.1 Make observations of an object or event using many methods.

2.1.2 Estimate or measure length, volume, temperature, and mass in metric units.

2.1.3 →

notes

9-12

2.1.1 Act on objects or events to observe changes in them.

2.1.2 Make precise measurements in metric units.

2.1.3 Discuss inherent error of any measurement.

notes

17

2.2 Classify and use space / time relationships to organize information

K-4	5-8	9-12
2.2.1 Classify objects by their properties.	2.2.1 →	2.2.1 →
2.2.2 Identify properties useful for classifying objects.	2.2.2 Construct a three-stage classification.	2.2.2 Use standard classification schemes.
	2.2.3 Use angles and compass headings to communicate directions.	2.2.3 →
		2.2.4 Describe location in terms of relative position (frame of reference) and time.
	2.2.5 Calculate area, volume, and speed.	2.2.5 Determine motion relative to stationary and moving objects.
	2.2.6 Distinguish between relevant and irrelevant information.	2.2.6 →
notes	notes	notes

2.3 Infer, hypothesize, and predict to interpret information

K-4	5-8	9-12
2.3.1 Distinguish between an observation and an inference.	2.3.1 →	2.3.1 →
2.3.2 Make an inference from a set of observations.	2.3.2 Identify observations that support, or do not support, an inference.	2.3.2 Distinguish between probable and less probable inferences.
	2.3.3 Identify the inference being tested in a given experiment.	2.3.3 →
	2.3.4 Revise an inference on basis of additional data.	2.3.4 Describe additional observations needed to test alternative inferences.
2.3.5 Make predictions based on measurements.	2.3.5 Make predictions from tables or graphs.	2.3.5 Evaluate the reliability of a prediction.
2.3.6 Identify the definition of hypothesis.	2.3.6 →	2.3.6 Formulate a hypothesis as an "If-then" statement.

notes

notes

notes

2.4 Formulate testable questions, make operational definitions, control variables, and design experiments to generate information

K-4

2.4.1 Identify questions that can and cannot be tested.

2.4.2 Identify an object by an operational definition.

2.4.4 Identify the variable which is deliberately changed in an experiment.

2.4.5 Conduct an experiment to test an inference.

2.4.6 Use models to explain phenomena.

notes

5-8

2.4.1 Formulate a question that can be tested by experiment.

2.4.2 Construct an operational definition by stating what is to be done, observed, measured.

2.4.3 Identify variables held constant in an experiment.

2.4.4 Name the manipulated (independent), responding (dependent), and variables held constant in an experiment.

2.4.5 Design an experiment to test an inference or hypothesis.

2.4.6 Formulate mental models to aid in the design of experiments.

notes

9-12

2.4.1 Formulate multiple questions about a given phenomenon which can be tested by experiment.

2.4.2 Use operational definitions to clarify experiments and reports.

2.4.3 →

2.4.4 Identify experiments which require large sample sizes to compensate for uncontrolled variables.

2.4.5 Evaluate the design of experiments.

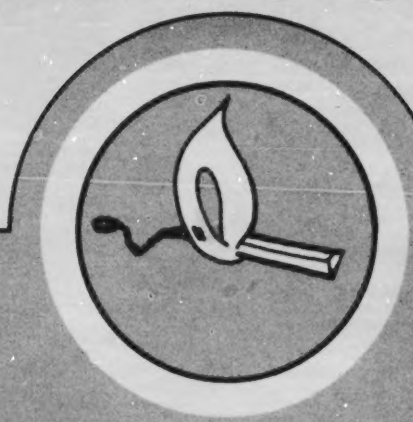
2.4.6 Evaluate the use of mental models to explain natural phenomena.

2.4.7 Describe the relationship between the confidence in the outcome of an experiment and the number of times the experiment is repeated.

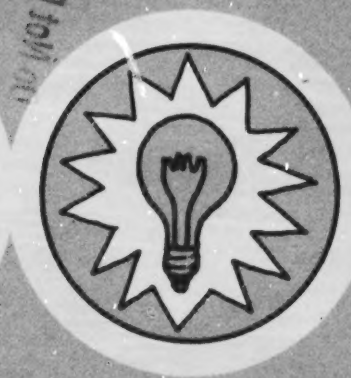
notes

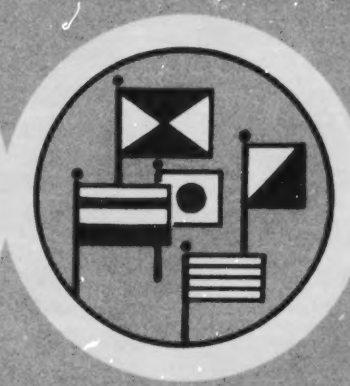
2.5 Communicate the interpretation of data

K-4	5-8	9-12
2.5.1 Describe what was tested in an experiment or what conclusion was drawn.	2.5.1 After an experiment, report the question tested, experimental design used, results, and conclusions drawn, using tables and graphs where appropriate	2.5.1 Report on an investigation in an organized manner with clarity of expression suitable for an audience unfamiliar with the investigation.
2.5.2 Identify the best representation of the results of an experiment.	2.5.2 →	2.5.2 →
notes	notes	notes



3.0 Understand the nature of science.



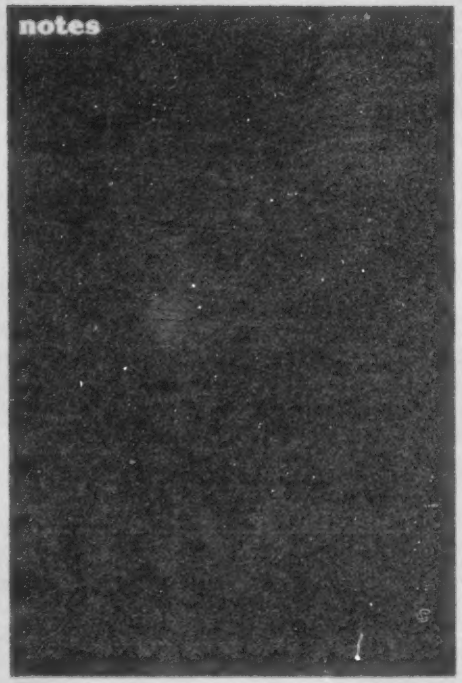


3.1 Understand that science is based on cause and effect

K-4

3.1.1 Give examples of cause and effect relations.

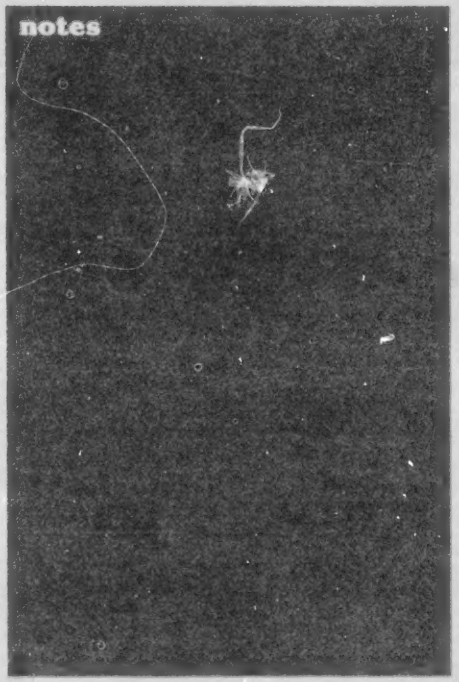
notes



5-8

3.1.1 State the immediate antecedent (cause) of a phenomenon (effect).

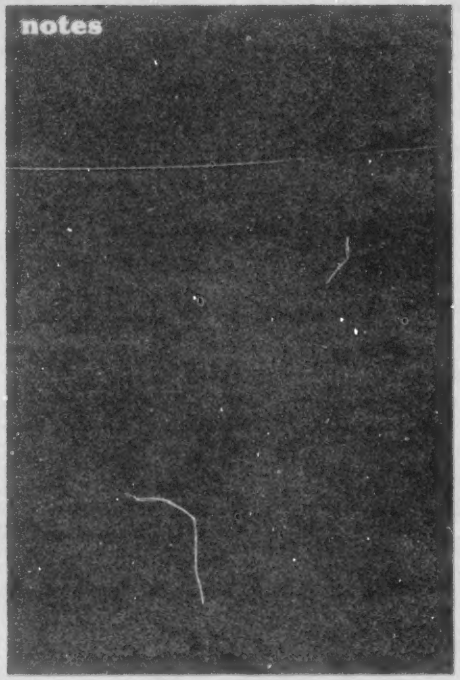
notes



9-12

3.1.1 Distinguish between cause and effect relations and non-cause and effect relations.

notes



25

3.2 Summarize the nature of scientific knowledge

K-4

3.2.1 Make several observations before drawing a conclusion.

3.2.2 Identify more than one explanation for an observation.

notes

5-8

3.2.1 Explain why science is tentative, public, and replicable.

3.2.2 Explain why science is tentative even though based on observations.

3.2.3 Distinguish between descriptive statements and statements of values.

notes

9-12

3.2.1 →

3.2.2 →

3.2.3 →

3.2.4 Understand the organization of scientific knowledge, i.e., facts, laws, theories.

notes

3.3 Summarize the nature of scientific inquiry as encompassing serendipity (chance), intuitive jumps, and induction as well as the scientific method.

K-4

3.3.1 Identify characteristics of the nature of science.

notes

5-8

3.3.1 State reasons for the use of scientific methods.

3.3.2 Evaluate the contribution to the understanding of the natural world made by theory and scientific methods.

notes

9-12

3.3.1 Compare the strengths and limitations of the scientific method.

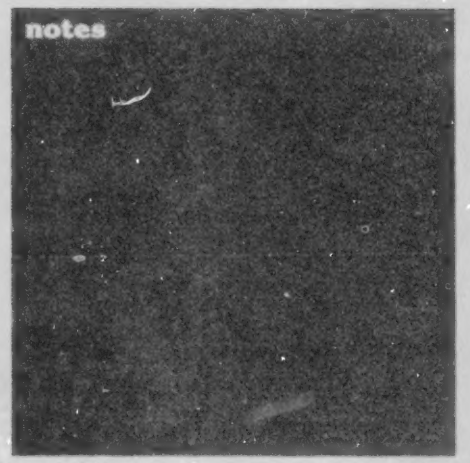
3.3.2 Evaluate the contributions to the understanding of the natural world made by serendipity (chance), intuition, theory, and scientific methods.

notes

3.4 Evaluate the humanistic nature of scientific enterprise

K-4

notes



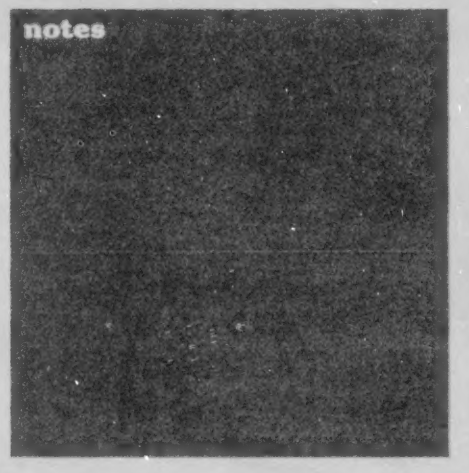
5-8

3.4.1 Identify scientists from several cultures.

3.4.2 List behaviors that scientists use (e.g., observing, measuring, using precise language, cooperating with other scientists).

3.4.3 Name qualities that are important for scientists to possess (e.g., curiosity, objectivity, openmindedness, being unbiased, believing in cause and effect).

notes

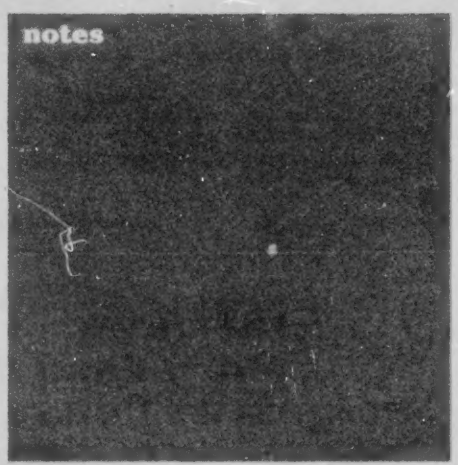


9-12

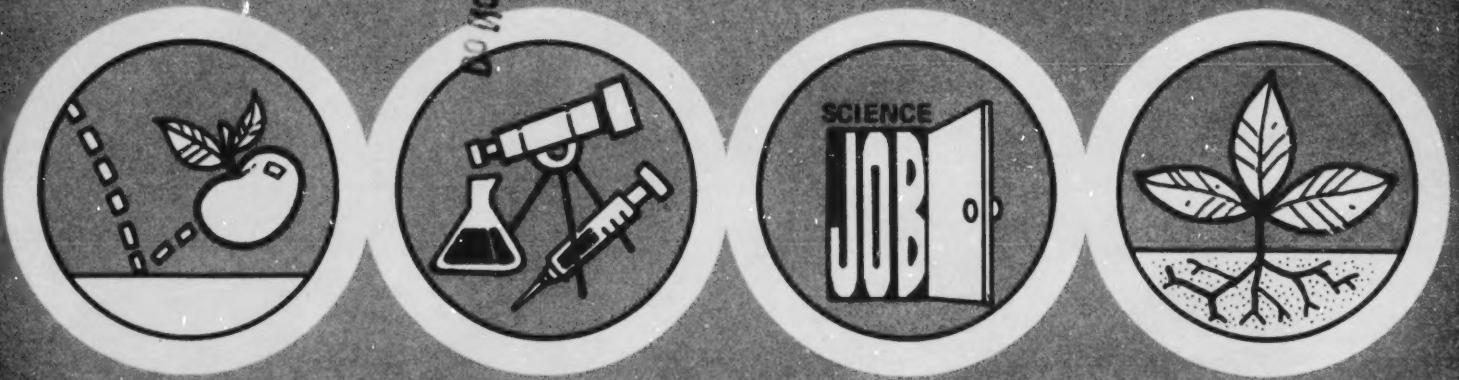
3.4.1 Give examples of the interactions of a scientist and his society, e.g., Galileo or Einstein.

3.4.2 Explain how the behavior of a scientist has influenced his contribution to the scientific enterprise.

notes



4.0 Evaluate the interrelationships among science, technology, and society.



4.1 Apply science / technology to common life tasks

K-4

4.1.1 Give examples of personal use of science knowledge at home.

notes

5-8

4.1.1 Identify methods of insect control.

4.1.2 Evaluate validity of advertising claims.

4.1.3 Control variables when repairing malfunctioning equipment.

4.1.4 Identify hazards presented by specific constituents of common household products and take appropriate safety measures.

notes

9-12

4.1.1 Identify the advantages and disadvantages of the various methods of insect control.

4.1.2 →

4.1.3 →

4.1.4 →

notes

31

4.2 Recognize that science and technology can have both positive and negative effects on one's personal life

K-4

4.2.1 List positive and negative effects of scientific/technological innovations, e.g., television, throw-away packaging.

notes

5-8

4.2.1 List positive and negative effects of scientific/technological innovations, e.g., automobile catalytic converter or throw-away packaging.

4.2.2 Predict a sequence of consequences resulting from a scientific/technological change.

notes

9-12

4.2.1 Name possible positive and negative effects on one's personal life of a current research endeavor, e.g., DNA modification or a dental vaccine.

4.2.2 →

notes

4.3 Understand both the potentials and the limitations of science and technology

K-4

notes

5-8

4.3.1 Identify problems that do not qualify as subjects for scientific investigation, i.e., questions of value.

4.3.2 Identify areas of current scientific research, e.g., dental caries vaccine, new energy sources.

notes

9-12

4.3.1 Given a science-related problem, e.g., development of nuclear power plants, classify factors affecting a decision as scientific, economic, or environmental considerations.

4.3.2 Explain the values of "basic" as opposed to "technological" research.

notes

4.4 Recognize the historical sequence and cumulative nature of important scientific discoveries

4.4.1 Identify significant events that contributed to a scientific or technological development, e.g., Law of Gravity, radio receiver.

4.4.2 Place in chronological order the names of three or more people who contributed to a scientific development.

notes

notes

notes

K-4

5-8

9-12

4.5 Know the nature and scope of careers in science and technology

K-4

4.5.1 Identify careers in science and/or technology.

4.5.3 Identify activities of people in scientific/ technological careers.

notes

5-8

4.5.1 Identify three or more careers in which knowledge of a particular area of science is important.

4.5.3 Identify non-academic places where scientific or technological work is carried out, e.g., electrical power plant.

notes

9-12

4.5.1 Name science careers related to solving a given societal problem.

4.5,2 Identify kinds of science careers available now and in the future.

4.5.3 Describe the activities of a person in a specific scientific career.

notes

35

4.6 Evaluate career opportunities in scientific / technological fields

4.6.1 Identify the job entry requirements and benefits of one or more scientific/technological careers.

4.6.2 State the number of job openings in a given science-related career.

4.6.3 Evaluate own suitability for a science career.

notes

notes

notes

4.7 Demonstrate proficiency in entry level, science-related job skills

4.7.1 Use measuring equipment common to a particular science-related career.

4.7.2 Demonstrate basic laboratory techniques.

4.7.3 Demonstrate basic laboratory safety procedures.

4.7.4 Demonstrate techniques useful in a science-related career, e.g., propagate plants, write a computer program, culture micro-organisms.

notes

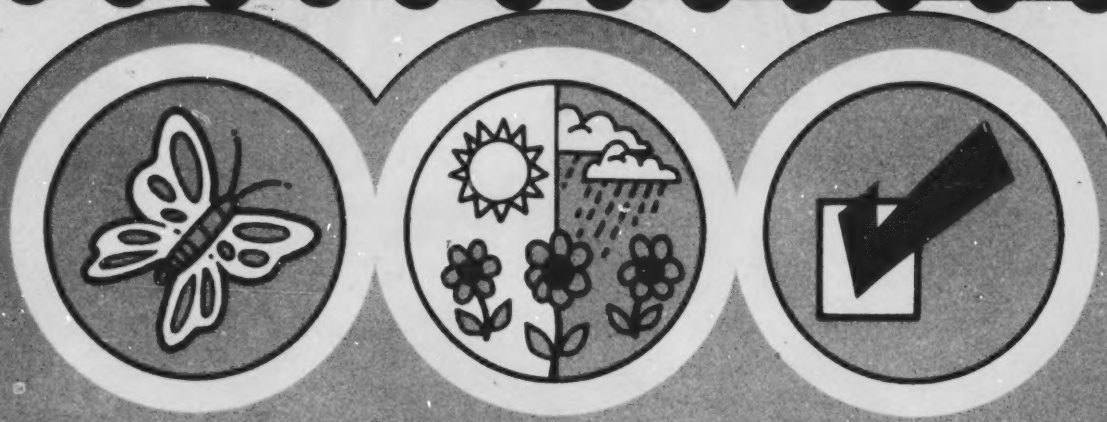
notes

notes

K-4

5-8

9-12



5.0 Demonstrate scientific attitudes.

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5.1 Demonstrate a continuing interest in science-related leisure time activities

K-4

5.1.1 Indicate participation in science-related, leisure time activities.

notes

5-8

5.1.1 Pursue science-related leisure activities at home.

notes

9-12

5.1.1 Pursue science-related leisure activities at home and in the community.

notes

5.2 Show curiosity about science-related phenomena

5.2.1 Inquire about science-related phenomena.

5.2.2 Inquire about interrelations in the natural world.

K-4	5-8	9-12
notes	notes	notes

5.3 Display confidence in own ability to use science

K-4

5.3.1 Use scientific terms and vocabulary.

notes

5-8

5.3.1 Use science processes in non-science activities.

notes

9-12

5.3.1 Volunteer to attempt scientific investigations.

5.3.2 Make personal decisions about one's abilities and choices of courses.

notes

5.4 Practice cooperation with others in science studies

5.4.1 Work cooperatively with classmates.

notes

K-4

5.4.1 Give credit to others for assistance.

notes

5-8

5.4.1 Give credit to others.

notes

9-12

5.5 Use objective approach in problem-solving

K-4	5-8	9-12
5.5.1 Seek several sources of information.	5.5.1 →	5.5.1 →
	5.5.2 Question statements when in doubt.	5.5.2 Question statements made in an authoritative manner.
	5.5.3 Question hypotheses when in doubt.	5.5.3 Question hypotheses which resist testing.
	5.5.4 Select scientific (testable) explanations of phenomena over non-scientific (non-testable) explanations.	5.5.4 Select scientific explanations of phenomena over non-scientific explanations.
	5.5.5 Report conflicting data when presenting results of an investigation or when presenting arguments.	5.5.5 →
	5.5.6 Phrase conclusions in tentative terms.	5.5.6 →
notes	notes	notes

5.6 Demonstrate divergent thinking in solving problems

K-4

5.6.1 Select alternative procedures for problem-solving.

notes

5-8

5.6.1 Propose alternative approaches and solutions to problems.

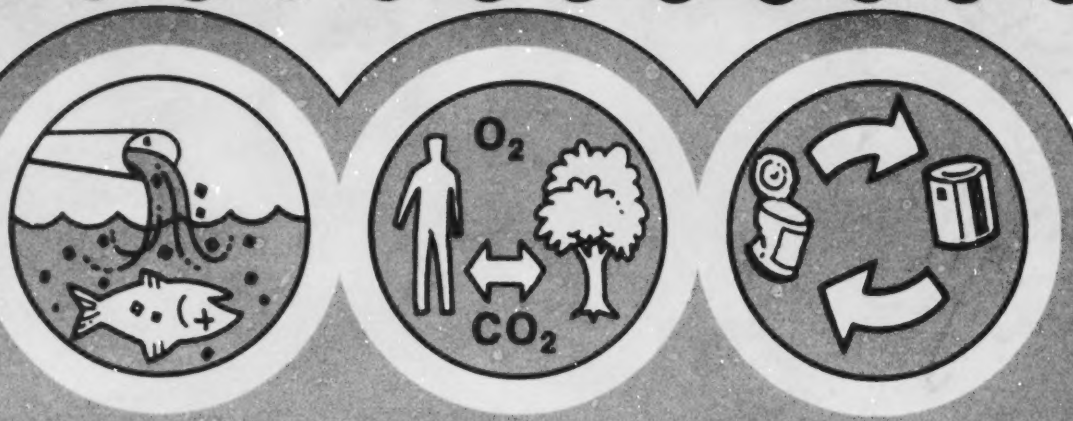
notes

9-12

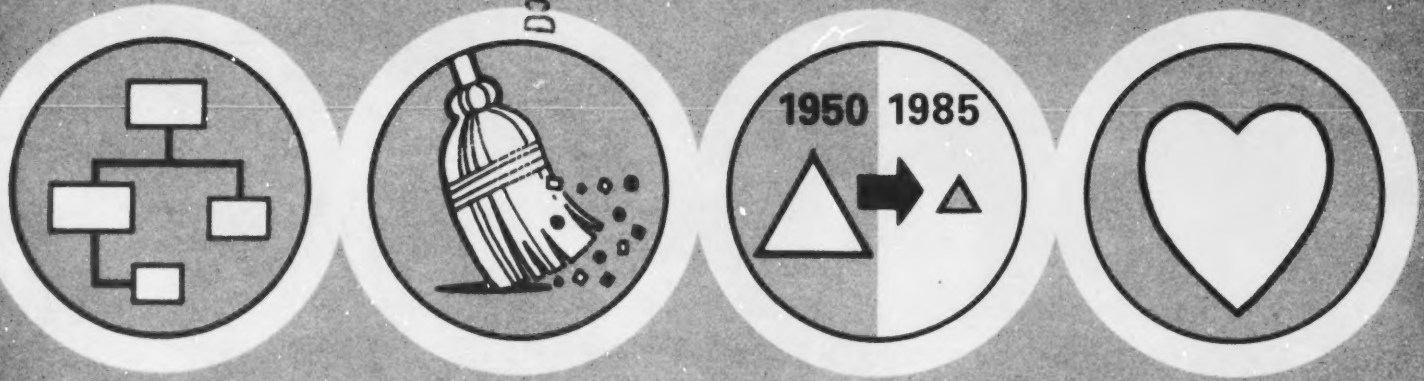
5.6.1 Design alternative approaches and solutions to problems.

5.6.2 Predict advantages and disadvantages from using alternate approaches.

notes



6.0 Develop science-related values which result in actions constructive to the environment.



6.1 Understand the relationships between the state of the environment and the quality of life

K-4

6.1.1 Identify pleasant and unpleasant environmental conditions.

6.1.2 Identify sources and effects of pollution on the local quality of life.

notes

5-8

6.1.1 List environmental conditions which may be pleasant or unpleasant to others.

6.1.2 Describe the effects of pollution on the lives of people.

notes

9-12

6.1.1 Evaluate the quality of life as a function of environmental conditions in own community.

6.1.2 →

6.1.3 Describe the effects of population levels on the quality of life.

notes

6.2 Understand the interdependence of people and the environment

K-4

6.2.1 Identify the basic needs of people and how the environment provides for them.

6.2.2 Identify the place of people in a food chain.

notes

5-8

6.2.1 List ways in which people living in a given environment have adapted to that environment.

6.2.2 Identify the place of people in a food web.

notes

9-12

6.2.1 Describe ways in which major changes in a given environment have affected human life patterns.

6.2.2 Explain the effects on people of the removal of an element of a food web of which they are a part.

6.2.3 Explain the environmental impact of various farming practices.

6.2.4 Determine causes of pollution and possible solutions.

notes

6.3 Understand the social and the technological values involved in the use of resources

K-4

6.3.2 Identify materials that can be recycled and those that cannot.

notes

5-8

6.3.1 Explain the terms renewable and non-renewable in terms of natural resources.

6.3.2 Differentiate materials that can be reused, recyled, and those that cannot.

6.3.3 Identify materials as biodegradeable or nonbiodegradeable.

notes

9-12

6.3.1 Describe possible future means of renewing natural resources.

6.3.2 Summarize reasons why materials are not recycled or reused.

6.3.3 →

notes

6.4 Understand environmental organizations and agencies and their functions

K-4

notes

5-8

6.4.2 Identify the major goals of private environmental organizations.

notes

9-12

6.4.1 Discuss the role of local, state, and/or Federal Government in protecting the natural environment.

6.4.2 Identify major activities of a given environmental organization, e.g., EPA, Nuclear Regulatory Commission, HUD, and Sierra Club.

notes

6.5 Show respect for the man-made environment

K-4

6.5.1 Protect the work and property of fellow students.

6.5.2 Show good housekeeping practices in the use of classroom equipment.

notes

5-8

6.5.1 Behave in a manner which protects the work and property of individuals and society.

6.5.2 Formulate good housekeeping procedures in the class and laboratory.

notes

9-12

6.5.1 Assist with design and implementation of a community improvement project.

6.5.2 Perform preventive maintenance on classroom resources.

notes

6.6 Practice environmentally sound consumerism

K-4	5-8	9-12
6.6.1 Identify reasons for conservation of resources.	6.6.1 Identify environmentally sound consumer products.	6.6.1 Justify buying practices in environmental terms.
	6.6.2 Apply the conservation ethic "Use it up, wear it out, make it do or do without!" to consumer practices.	6.6.2 →
notes	notes	notes

6.7 Demonstrate respect for the natural environment

K-4	5-8	9-12
6.7.1 Select ways to protect the local environment.	6.7.1 Defend limits on the use of natural environments.	6.7.1 →
6.7.2 Indicate participation in activities that protect the environment.	6.7.2 →	6.7.2 →
6.7.3 Display compassion for people and other living things.	6.7.3 →	6.7.3 Justify compassionate treatment for all living things.
notes	notes	notes

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